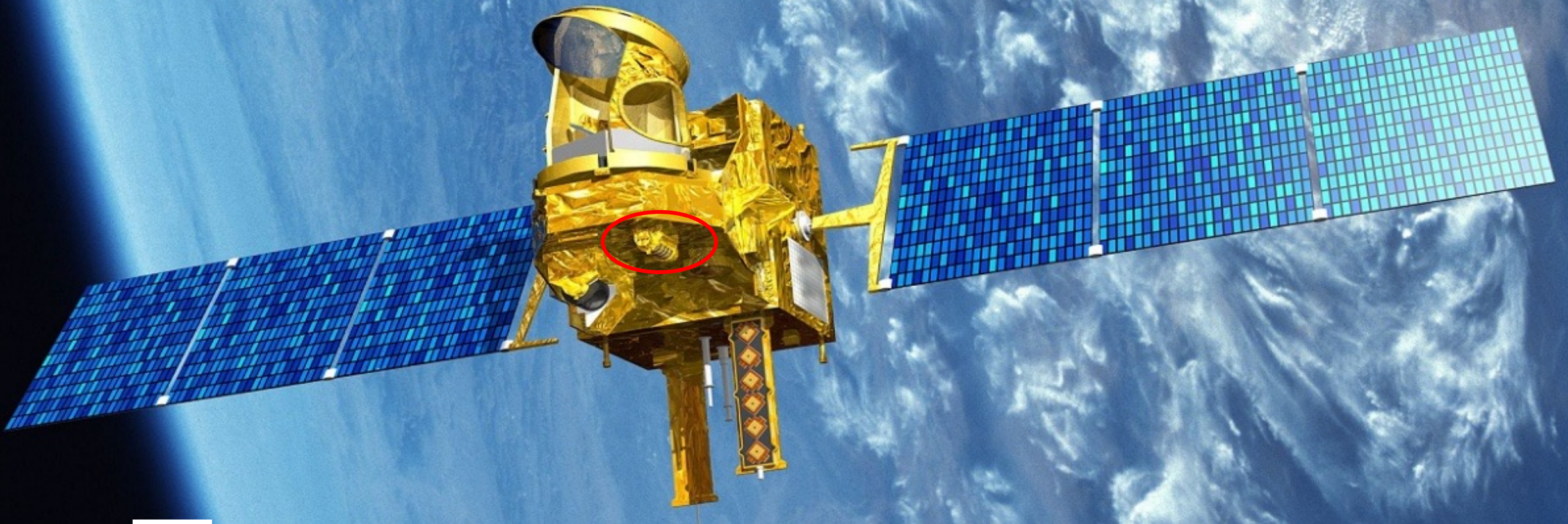


ScaRaB on-board Megha-Tropiques

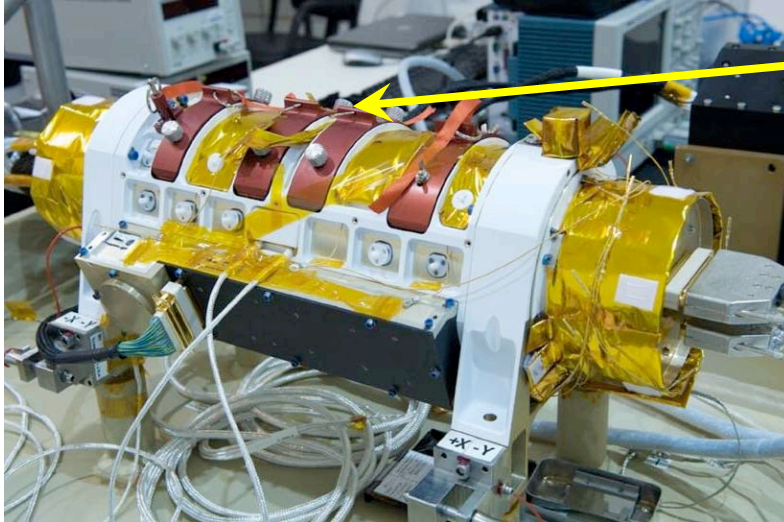
An end of mission review



Outline of the presentation

1. Quick recap on ScaRab and Megha-Tropiques
2. Highlights of the mission
 1. Cooperation with the CERES group
 2. GEO ring activities
 3. Life cycle resolved mesoscale convective systems
radiative properties
3. Conclusions

ScaRaB/3



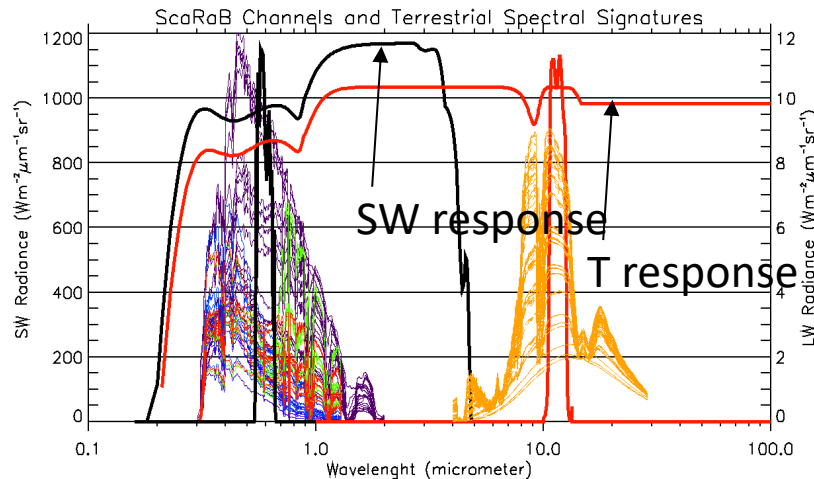
22 kg, 52 cm width, 40 watts
4 telescopes (in red)

Building on
ScaRab-1 Kandel et al
ScaRab-2 Duvel et al

- 2 main channels (# 2 & 3, broad band)
- 2 auxiliary channels (# 1 & 4 narrow band)
- Cross track scanning (2300 km swath)
- **40 km resolution at nadir**

No VIS/IR imager

ScaRaB goal : To determine the longwave and shortwave outgoing fluxes observations at the TOA



Channel	Description	Spectral Interval	Filter
1	VIS (visible)	0.55 – 0.65 μm	Interferential
2	SW (or solar)	0.2 – 4 μm	Silice filter
3	T (total)	0.2 – 100 μm	No filter
4	IR (Infrared)	10.5 – 12.5 μm	Interferential

$$L_{\text{LW}}(\text{daytime}) = L_{\text{TOTAL}} - A' \times L_{\text{SW}}$$

A' depends on the spectral response
of T and SW channels

ScaRaB/3 and the Megha-Tropiques mission



Thanks to the inclined orbit and altitude, ScaRaB gives

- a large swath with relatively large pixels
- precessing measurements all through the diurnal cycle

A small scientific team:

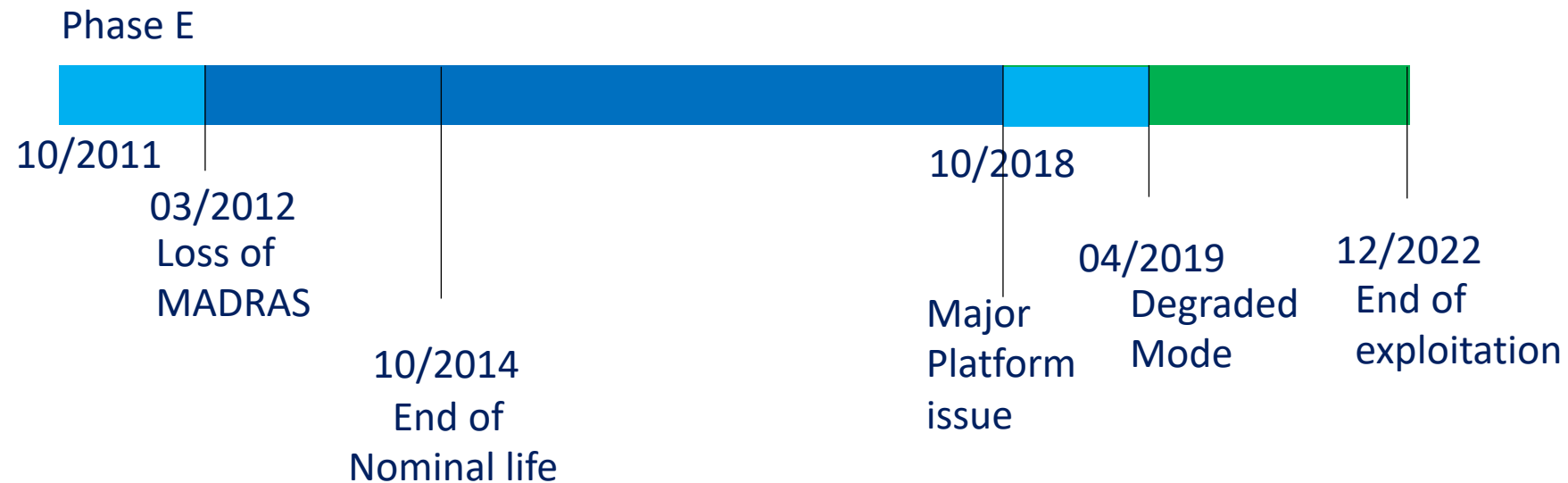
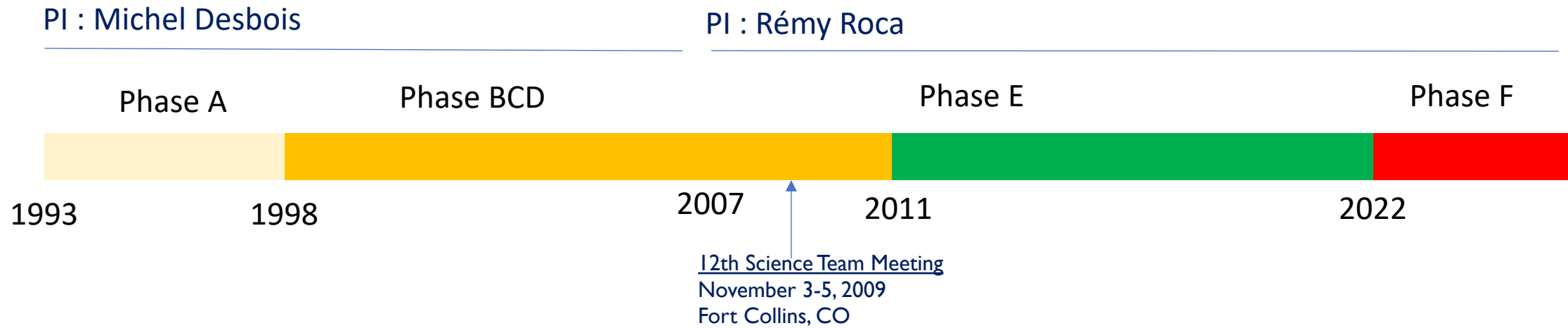
Michel Viollier, Michel Desbois, Michel Capderou, Olivier Chomette, Patrick Raberanto, Sophie Cloché, Thomas Fiolleau and me

A small instrument CNES team:

Alain Rosak, Nadia Karouche, Michel Dejus, JL Raynaud,...

The Megha-Tropiques mission timeline

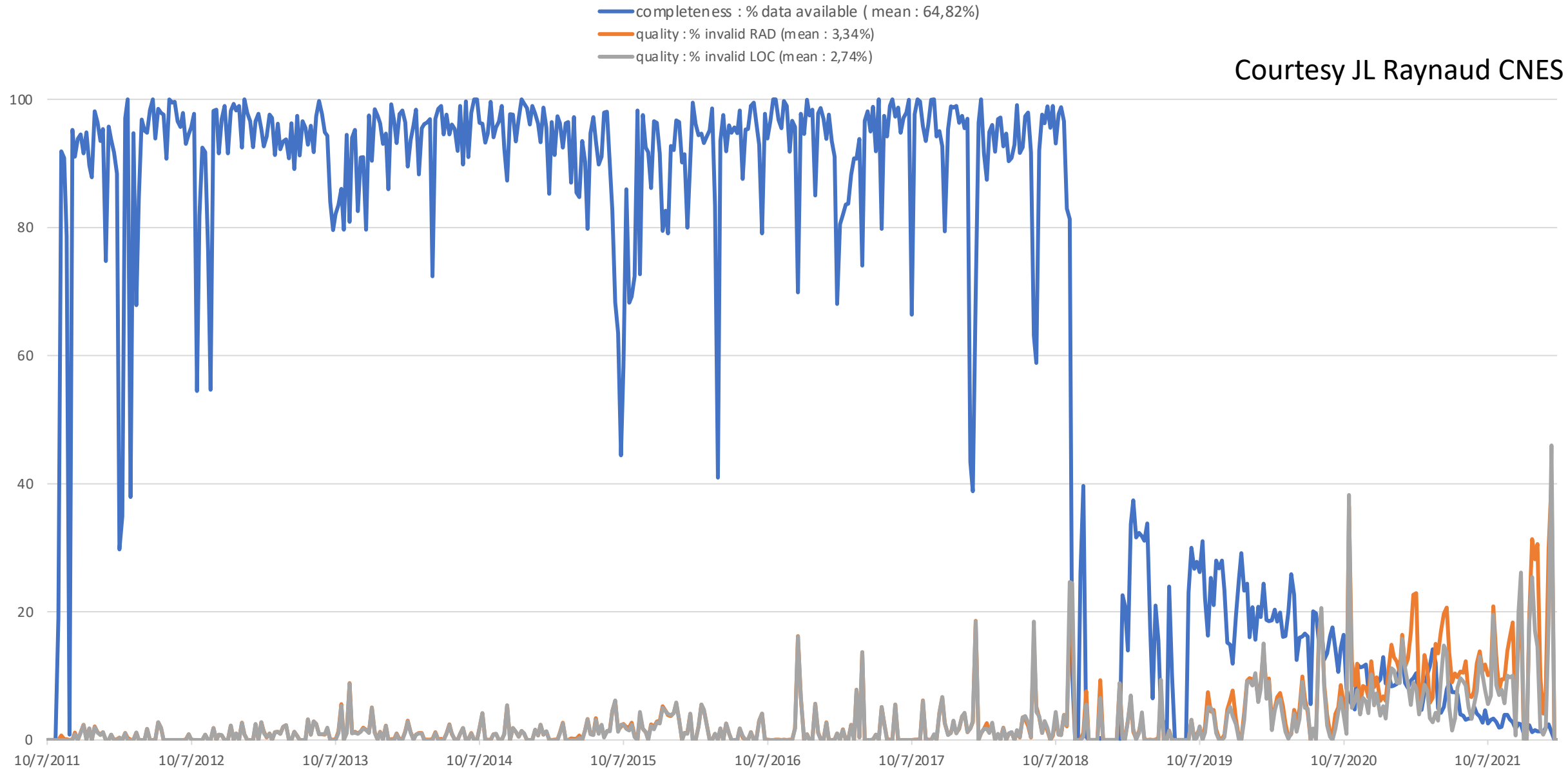
A joint mission between ISRO and CNES



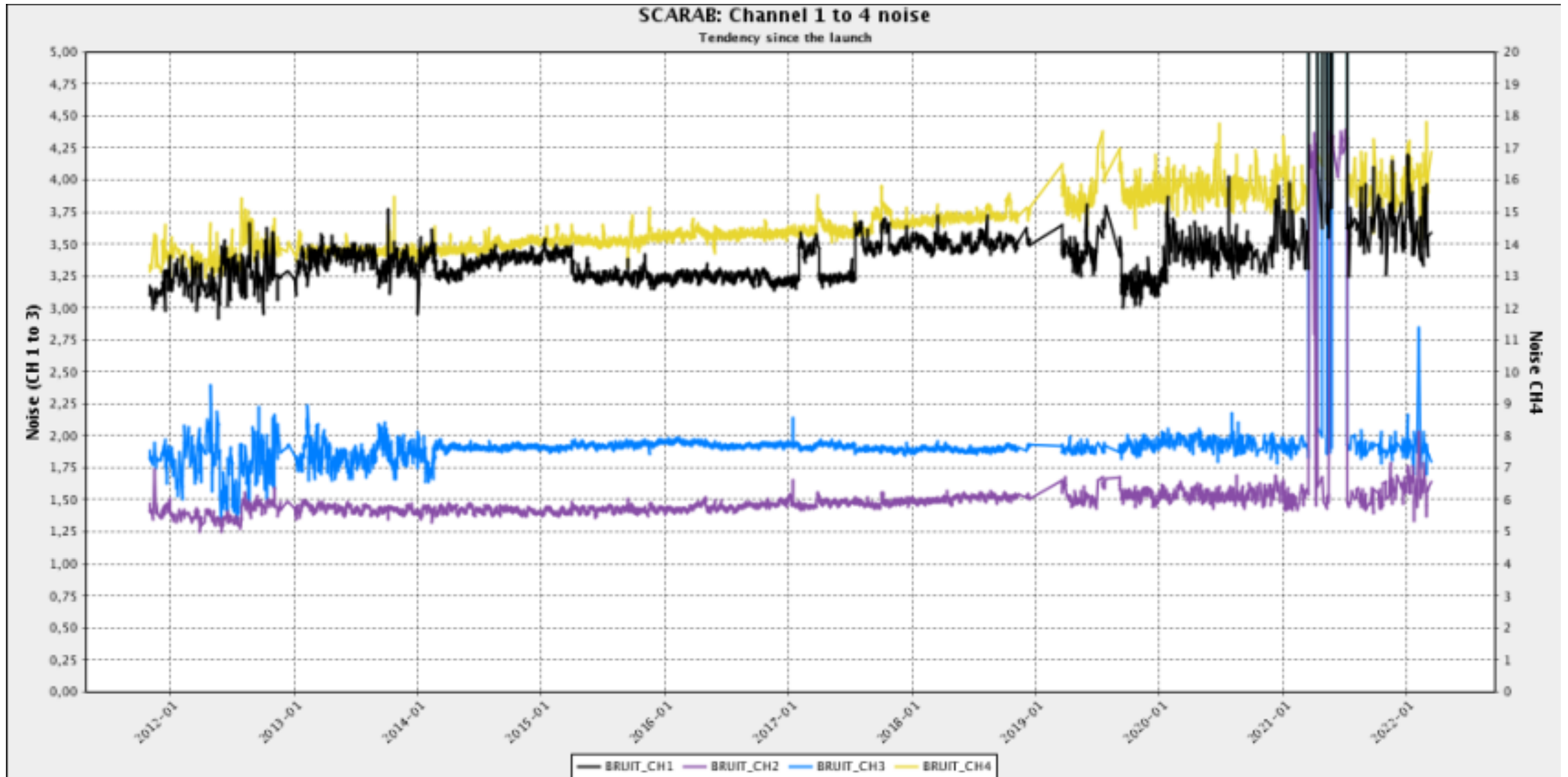
The ScaRaB record (1/2)

Data completeness and quality
SCARAB L1A2 Dumpwise V10 000

120



The ScaRaB record (2/2)

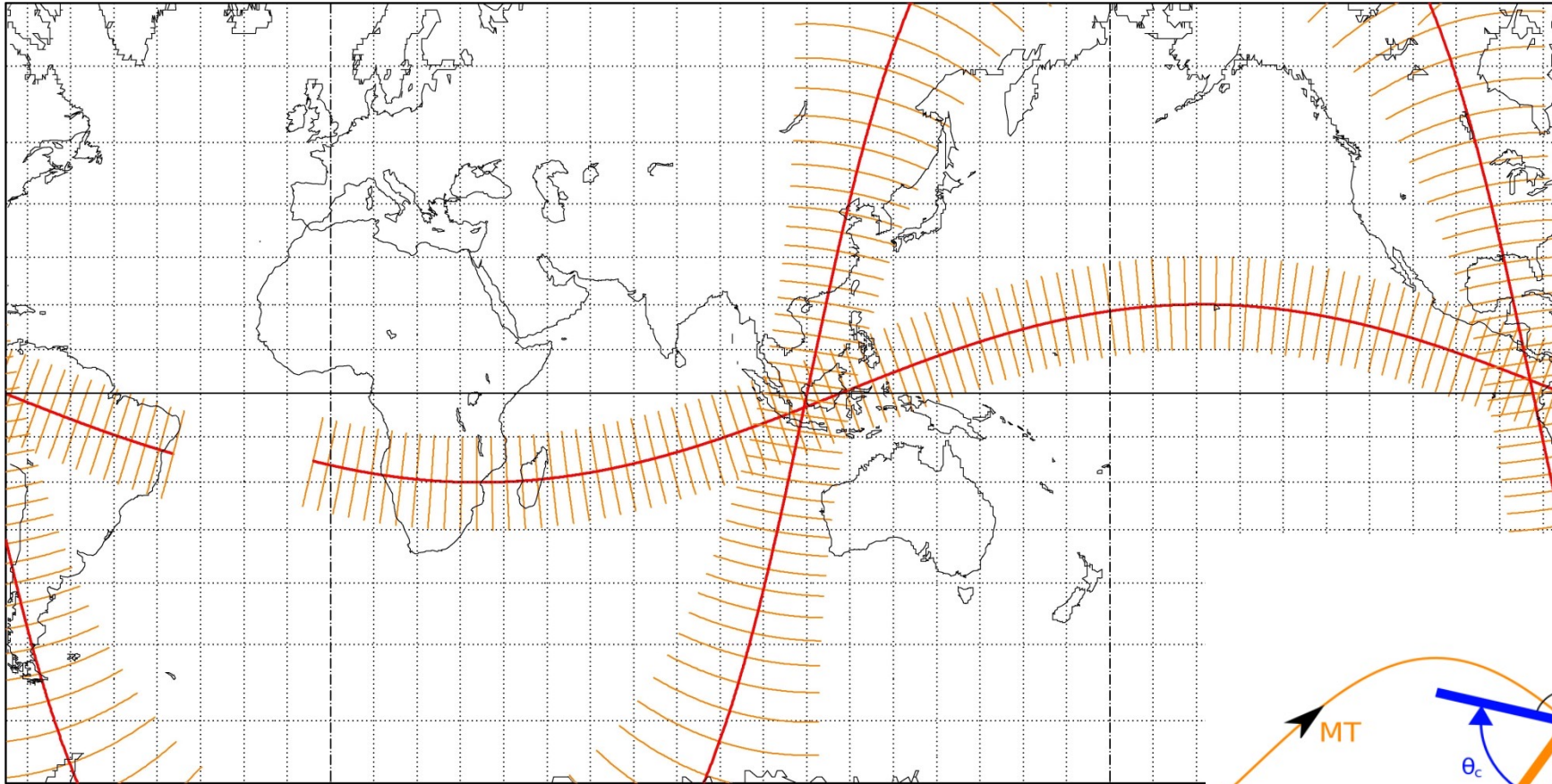


Courtesy JL Raynaud CNES

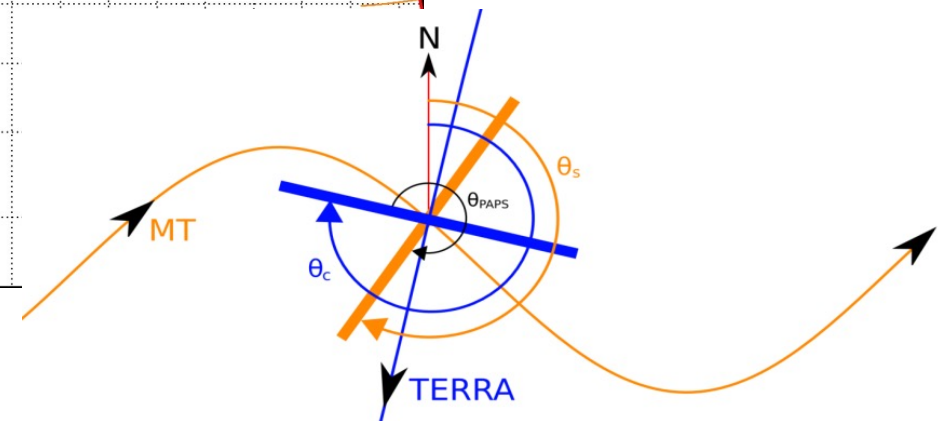
Comparisons with CERES

ScaRaB/MT → inclinaison 20° , demi-fauchée: 48.9° - XT mode

CERES/TERRA → inclinaison 98.2° , demi-fauchée : 55.2° - XT mode



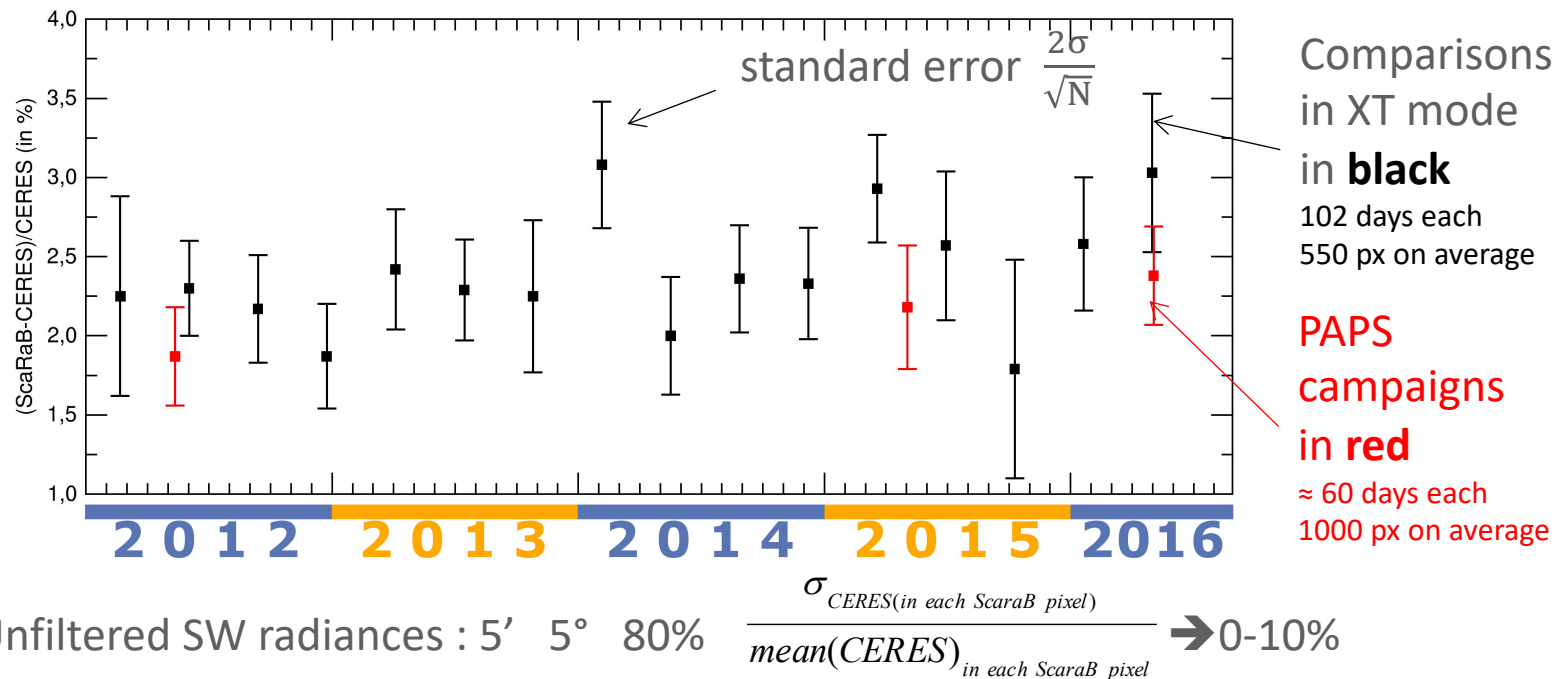
Courtesy Chomette, Raberanto, Capderou



NASA activates the programmable mode of CERES for each crossings during the campaign

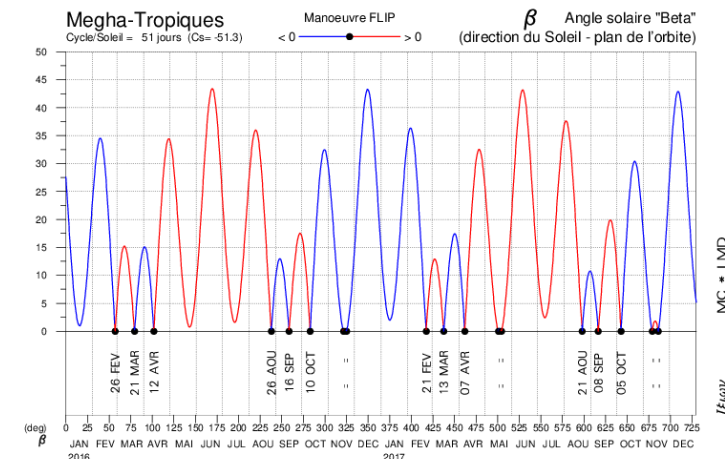
Comparisons with CERES

L1: CERES & ScaRaB are in good agreement. ➔ biais $\approx 2.5\%$ in SW, with error budget ScaRaB $\approx 1.6\%$, CERES $\approx 1\%$ (at 1σ) + errors brought by the colocation method $> 1.5\%$



L2: D. Doelling warned us about a mismatch of the definition of the Relative Azimuth Angle (RAA) between SCARAB and CERES (180° shift) but due to the flip manoeuvre it is true only part of the time!

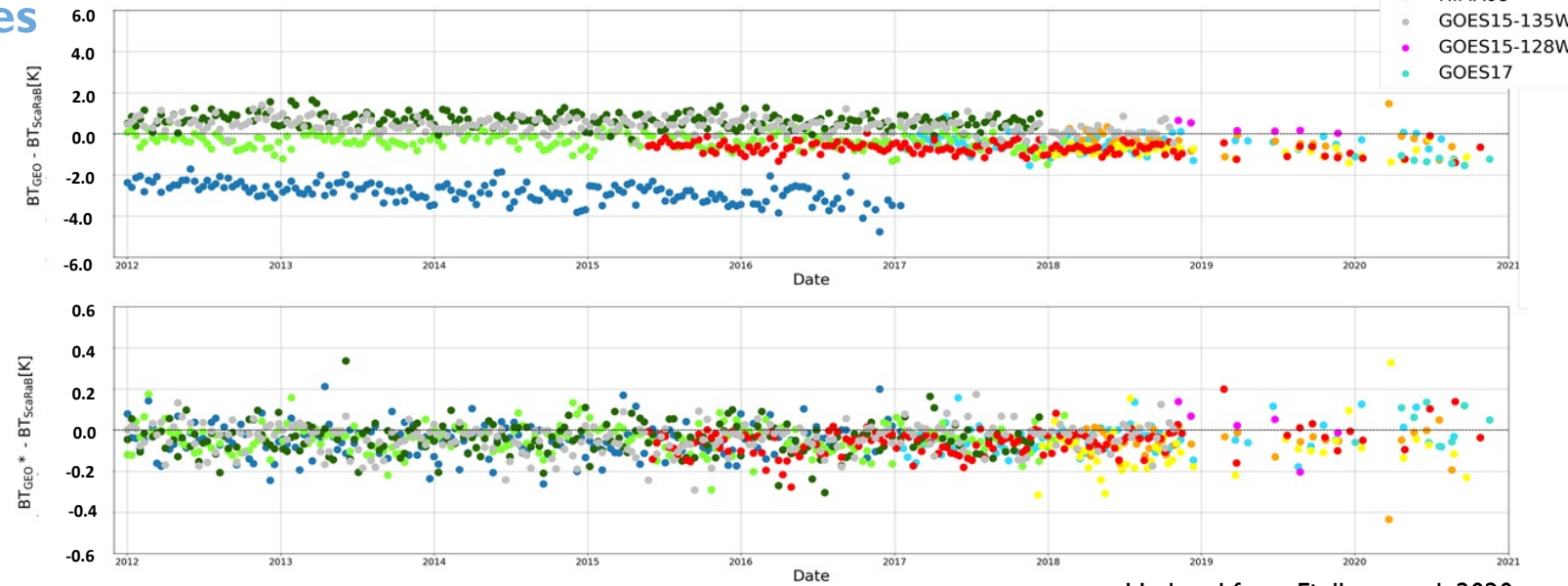
This has been fixed



ScaRaB and the georing

Spectral normalization and calibration corrections of the Tb_{GEOs} by using the SCARAB observations onboard Megha-Tropiques

- SCARAB-IR Channel 4 : $[10.5\mu m - 12.5 \mu m]$
- Temporal stability over the period



Quarterly

Newsletter – Winter 2020 Issue

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In this Issue

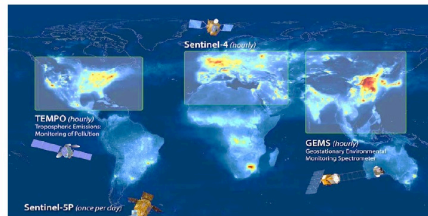
Articles

Using ScaRaB on board Megha-Tropiques to investigate the calibration of geostationary thermal infrared channels for cold cloud studies

By Thomas Fiolleau and Rémy Roca,
Laboratoire d'Etudes en Géophysique et
Océanographie Spatiales/CNRS, Toulouse,
France

The Copernicus Imaging Microwave
Radiometer Mission (CIMR)
By C. Donlon, ESA/ESTEC

Pv4CAtS: PYthon for Computational



Coverage of GK-2B the first UV GEO compliments S4 and Tempo in UV measurements



Artist rendition of Megha-Tropiques (Image Courtesy EO Portal)

Using ScaRaB on board Megha-Tropiques to investigate the calibration of geostationary thermal infrared channels for cold cloud studies

By Thomas Fiolleau and Rémy Roca

Radiative properties of MCS along their life cycle

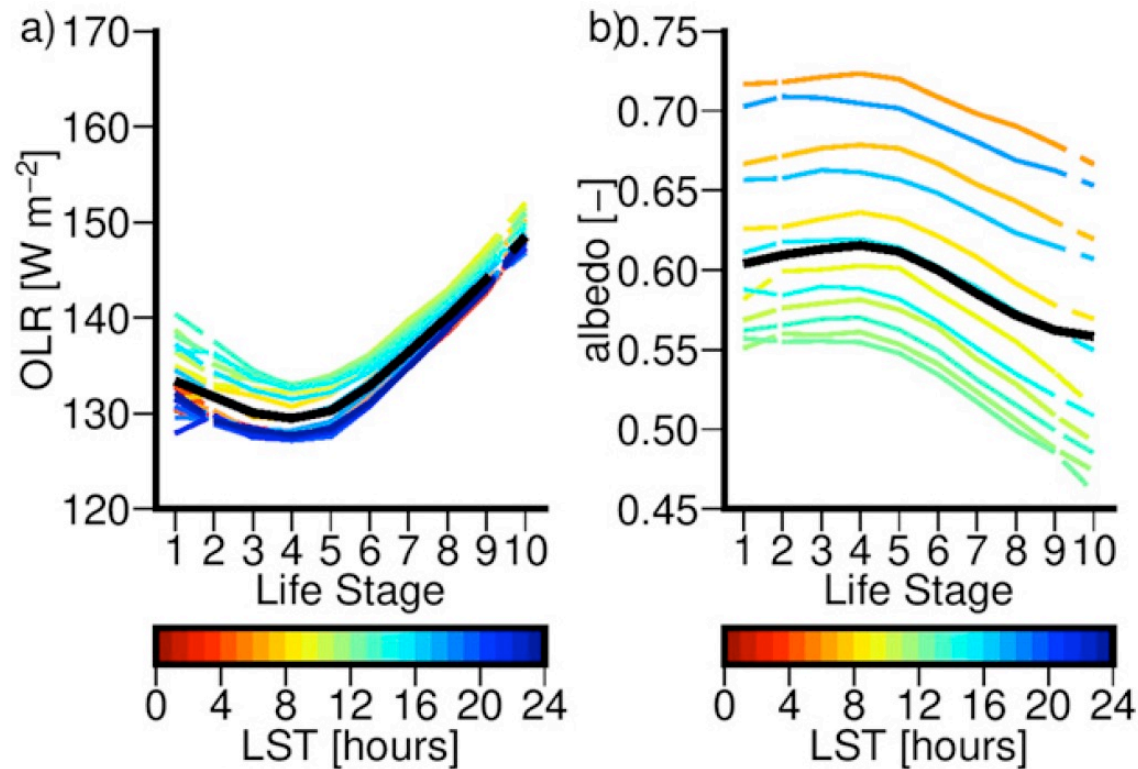
AUGUST 2021

BOUNIOU ET AL.

1091

Life Cycle–Resolved Observation of Radiative Properties of Mesoscale Convective Systems

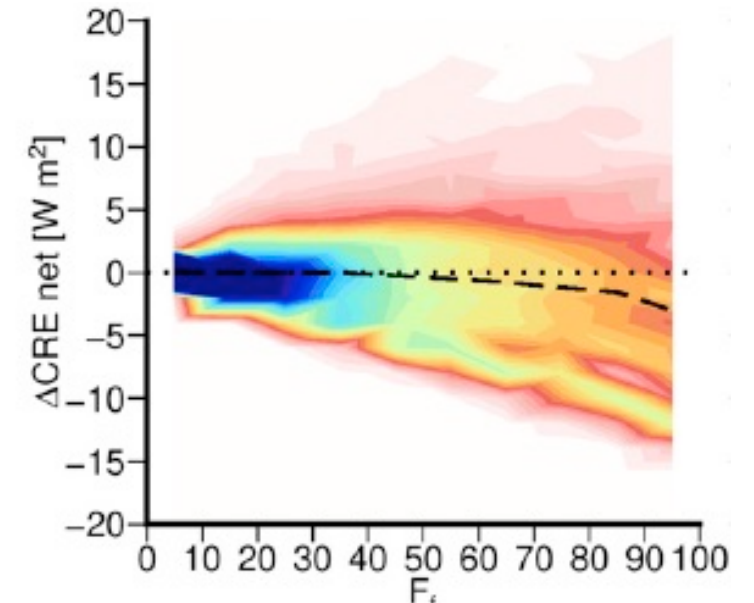
DOMINIQUE BOUNIOU,^a RÉMY ROCA,^b THOMAS FIOLEAU,^b AND PATRICK RABERANTO^c



OLR: life cycle

Albedo: LT and then life cycle

West Africa



Distribution of anomalies in CRE resulting from the omission of the evolution of radiative properties with the life cycle as a function of the gridpoint filling

Care for regional budget

Conclusions

ScaRaB-3 on Megha-Tropiques has come to an end:

10 years + of high quality TOA broad band radiances measurements and flux estimates on a precessing orbit

Highlights of science results

Cross-Validation of CERES and SCARAB dataset within their respective
instrumental uncertainty budget

Use for the GEORING calibration

Permit the characterization of the life cycle resolved radiative properties of the MCS
: actually a science objectif from 2003!

More to it: science results from India

A long running (and much appreciated) companionship with the CERES team

A long running (and much appreciated) companionship !



CERES-GERB-SCARAB meeting Paris, September 2010